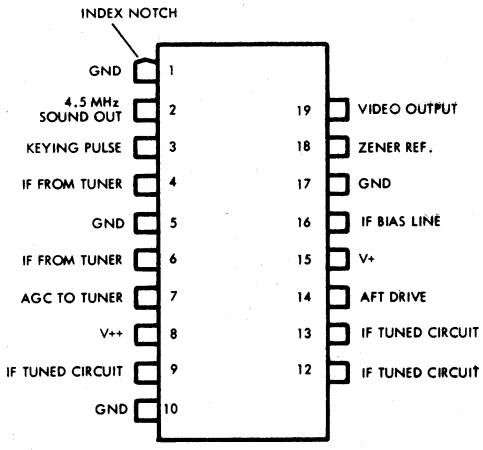
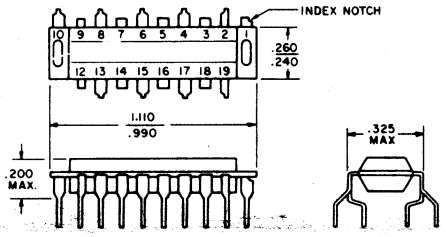
SYLVANIA ECG semiconductors

ECG730

TV VIDEO IF SYSTEM





FEATURES:

- High-gain wide-band IF amplifier: 75 dB typ. at 45 MHz
- Gain reduction with excellent stability: 50 dB typ. at 45 MHz
- Video detector with linear characteristics
- Video amplifier: 12 dB gain
- Impulse noise limiter
- Keyed AGC with noise immunity circuits
- Delayed AGC for tuner
- Buffered AFT output
- Separate sound IF intercarrier amplification
- Sound carrier detector
- 4.5 MHz sound carrier amplifier
- Isolated zener reference diode for regulated voltage supply

ECG730 is a monolithic integrated circuit that incorporates an entire video TV-IF subsystem on a single chip. Innovations in integrated circuit design, in addition to the many active devices and closely matched components utilized in the circuit, make the **ECG730** ideally suited for use in color and black-and-white TV receivers.

The primary functions performed by the IF subsystem are video IF amplification, linear detection, video output amplification, AGC from a keyed supply, AGC delay for tuner, sound carrier detection, sound carrier amplification, and a buffered AFT output. The advanced circuit design of the **ECG730** also includes secondary functions for improved noise immunity and minimal airplane flutter. An isolated zener reference diode, incorporated in the IC, provides a convenient and economical means for controlling the regulated voltage supply. The inherent wide bandwidth capability (10-70 MHz) and high overall gain (87 dB) make the **ECG730** suitable for other AM IF applications whose frequencies range within this bandwidth.

The **ECG730** utilizes a unique 20-lead quad-in-line plastic package. This package also includes a wrap-around shield that serves to minimize interlead capacitances.

MAXIMUM RATINGS, *Absolute Maximum Values, at $T_A = 25°C$*

DC Supply Voltage:		
Between Terminals 15 and 5*	11.3	V
Terminal 7 (Collector to ground)	20	V
Terminal 9 (Collector to ground)	20	V
DC Current (into Terminal 18)	2	mA
Device Dissipation:		
Up to $T_A = 60°C$	600	mW
Above $T_A = 60°C$	derate linearly 6.7	mW/°C
Ambient Temperature Range:		
Operating	−40 to +85	°C
Storage	− 65 to +150	°C
Lead Temperature (During soldering):		
At distance not less than 1/32" (0.79 mm) from case for 10 seconds max.	+265	°C

* This rating does not apply when using the internal zener reference in conjunction with the pass transistor.

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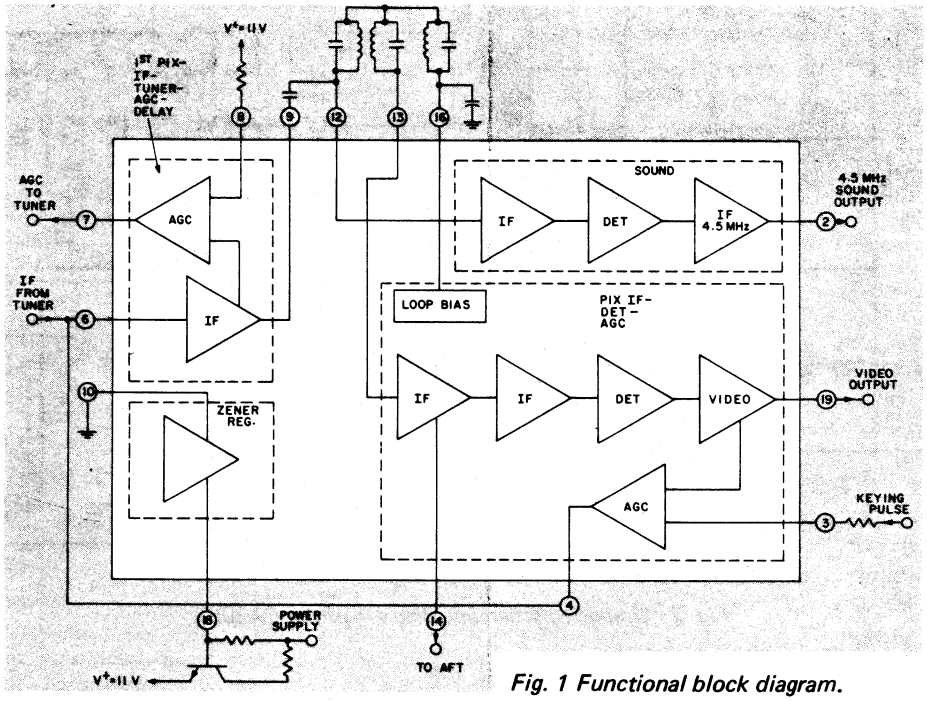


Fig. 1 Functional block diagram.

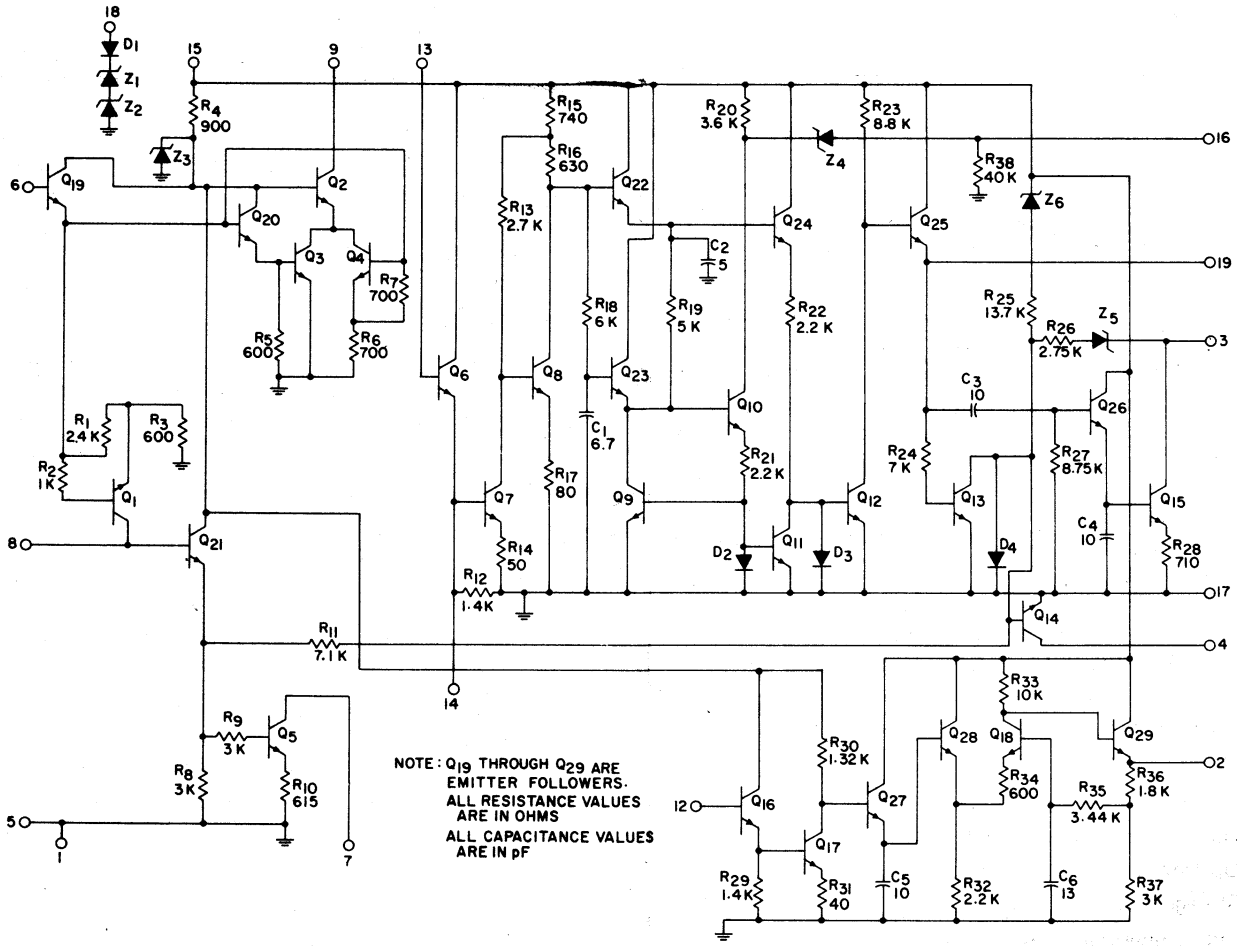


Fig. 2 - Simplified schematic diagram.

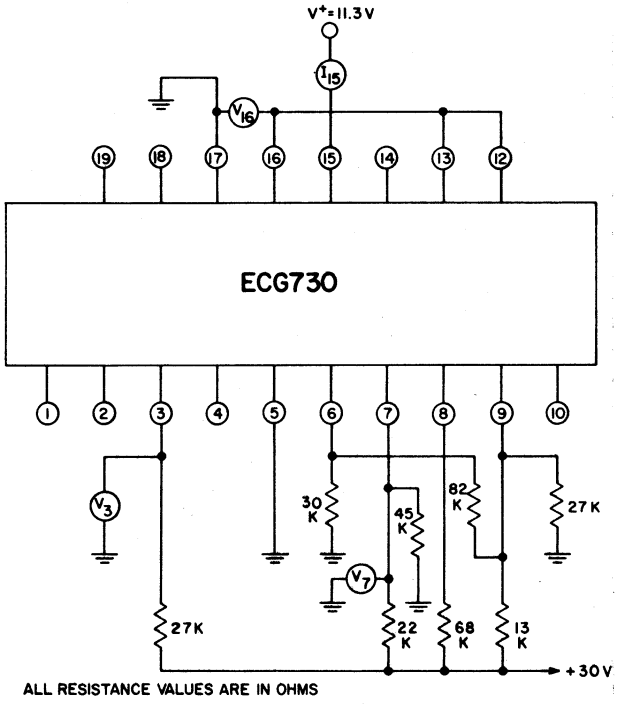


Fig. 3 – Test circuit for measurement of quiescent current (I_{15}), keying terminal voltage (V_3), bias voltage (V_{16}), AGC terminal voltage 1 (V_7), and cascode collector voltage (V_9)

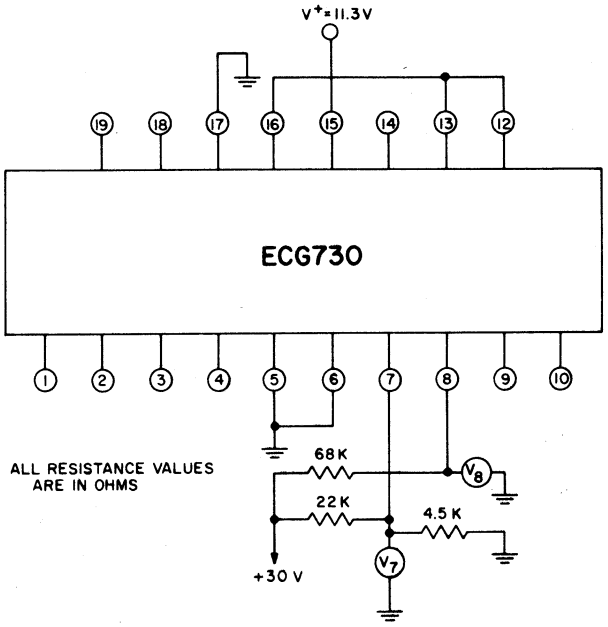


Fig. 4 – Test circuit for measurement of AGC terminal voltage 2 (V_7) and terminal 8 voltage (V_8).

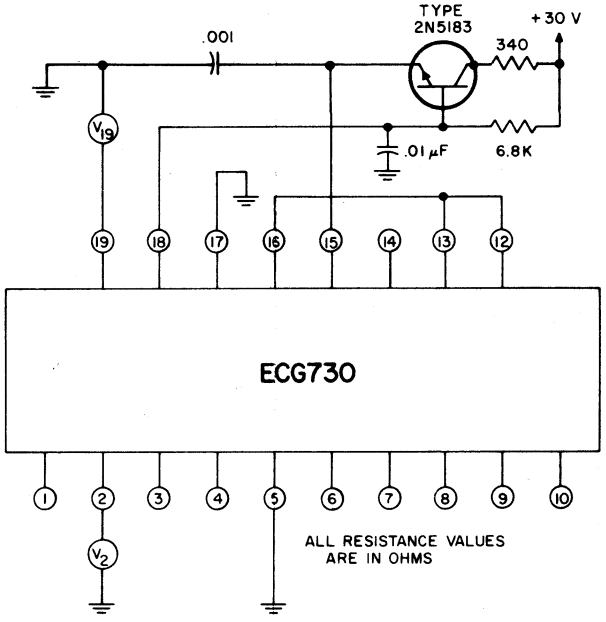
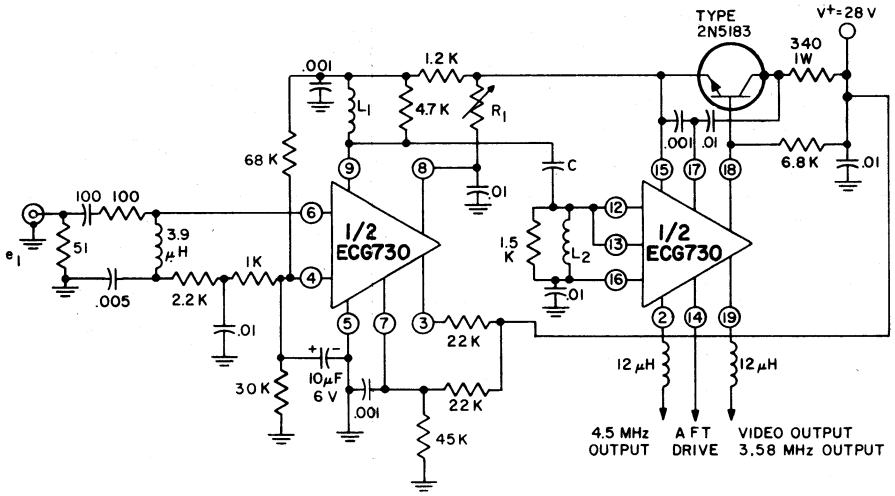


Fig. 5 – Test circuit for measurement of white level (V_{19}) and terminal 2 voltage (V_2).

ELECTRICAL CHARACTERISTICS at T_A = 25°C

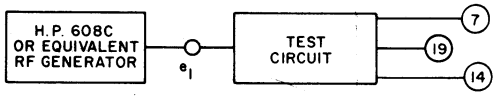
CHARACTERISTIC	SYMBOL	TEST CONDITIONS	CIRCUIT Fig. No.	LIMITS Min.	LIMITS Typ.	LIMITS Max.	UNITS
Static (DC) Characteristics							
Quiescent Circuit Current	I_{15}	–	3	15	–	45	mA
DC Voltages:							
Terminal 2 (Sound)	V_2	–	5	–	6	–	V
Terminal 3 (Keying Input)	V_3	–	3	6.4	–	10	V
Terminal 7 (1) (AGC)	V_7	–	3	16	–	21	V
Terminal 7 (2) (AGC)	V_7	–	4	–	1	–	V
Terminal 8 (AGC Delay)	V_8	–	4	–	4	–	V
Terminal 9 (Cascode Collector)	V_9	–	3	–	8.5	–	V
Terminal 16 (Bias)	V_{16}	–	3	1.1	–	2.3	V
Terminal 18 (Zener)	V_{18}	$V_5 = V_{17} = 0$ V, $I_{18} = 1$ mA	–	10.6	11.9	13.2	V
Terminal 19 (White Level)	V_{19}	–	5	6	–	10	V
Dynamic Characteristics							
Video Sensitivity	e_I	f_O = 45.75 MHz, Mod. (AM) = 85% at 400 Hz; Adjust e_I for 4 V_{p-p} at Term. 19	6	40	100	200	μV
Sync. Tip Level Voltage	V_{19}	f_O = 45.75 MHz, e_I(CW) = 10 mV	6	0.4	0.8	1.6	V
Automatic Fine Tuning (AFT) Drive Level Voltage	V_{14}		6	–	15	–	mV
Delay Bias Voltage:	V_7						
At e_I = 10 mV		f_O = 45.75 MHz, e_I(CW) = 20 mV;	6	16	–	–	V
At e_I = 30 mV		Adjust R_1 for V_7 = 14 V		0.5	–	2	V
3.58 MHz Chroma Output Voltage	V_{19}	f_O = 45.75 MHz, e_I(step mod.) = 10 mV; f_1 = 42.17 MHz, e_I(step mod.) = 3.33 mV	6	0.5	0.8	–	V
4.5-MHz Sound Output Voltage	V_2	f_O = 45.75 MHz, e_I(step mod.) = 10 mV; f_2 = 41.25 MHz, e_I(step mod.) = 2.5 mV	6	50	200	–	mV
Parallel Input Impedance:							
Resistance at Term. 6	R_{I-6}		7	4	–	–	kΩ
Capacitance at Term. 6	C_{I-6}			–	2	–	pF
Resistance at Term. 12	R_{I-12}	f_O = 45.75 MHz	7	–	4.5	–	kΩ
Capacitance at Term. 12	C_{I-12}	Impedance and Admittance measured at bias conditions as developed by circuit shown in Fig. 7		–	4	–	pF
Resistance at Term. 13	R_{I-13}		7	–	5	–	kΩ
Capacitance at Term. 13	C_{I-13}			–	4	–	pF
Parallel Output Impedance:							
Resistance at Term. 9	R_{O-9}		7	30	–	–	kΩ
Capacitance at Term. 9	C_{O-9}			–	3	–	pF
Cascode Transfer Characteristics: Magnitude of Forward Transadmittance	$\lvert y_f \rvert$		7	–	50	–	mmho
Reverse Transfer Capacitance	C_r		7	–	0.001	–	pF



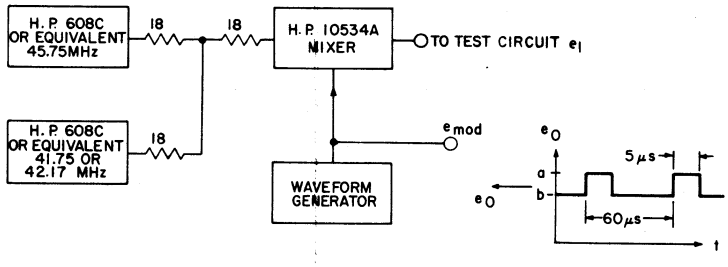
R_1 = 50 KΩ POTENTIOMETER
L_1 = 2.2 μH: ADJUST No. OF TURNS FOR ALIGNMENT
L_2 = 1.5 μH: ADJUST No. OF TURNS FOR ALIGNMENT
C ≅ 1 pF : ADJUST FOR PROPER ALIGNMENT

ALL RESISTANCE VALUES ARE IN OHMS

UNLESS OTHERWISE INDICATED, ALL CAPACITANCE VALUES:
LESS THAN 1.0 ARE IN MICROFARADS
1.0 OR GREATER ARE IN PICOFARADS



(a) Test setup for measurement of video sensitivity, sync. tip level, delay bias, AFT drive voltage.



ALL RESISTANCE VALUES ARE IN OHMS

1 - ADJUST LEVEL "a" TO GIVE 6 dB ATTENUATION OF MIXER

2 - ADJUST LEVEL "b" SO THAT THE STEP (a-b) AT VIDEO OUTPUT TERM. IS 3 VOLTS. APPLY ONLY 45.75 MHz TO ADJUST STEP WAVEFORM.

(b) Test setup for measurement of sound and chroma outputs.

Fig. 6 – Typical dynamic test circuit diagrams.

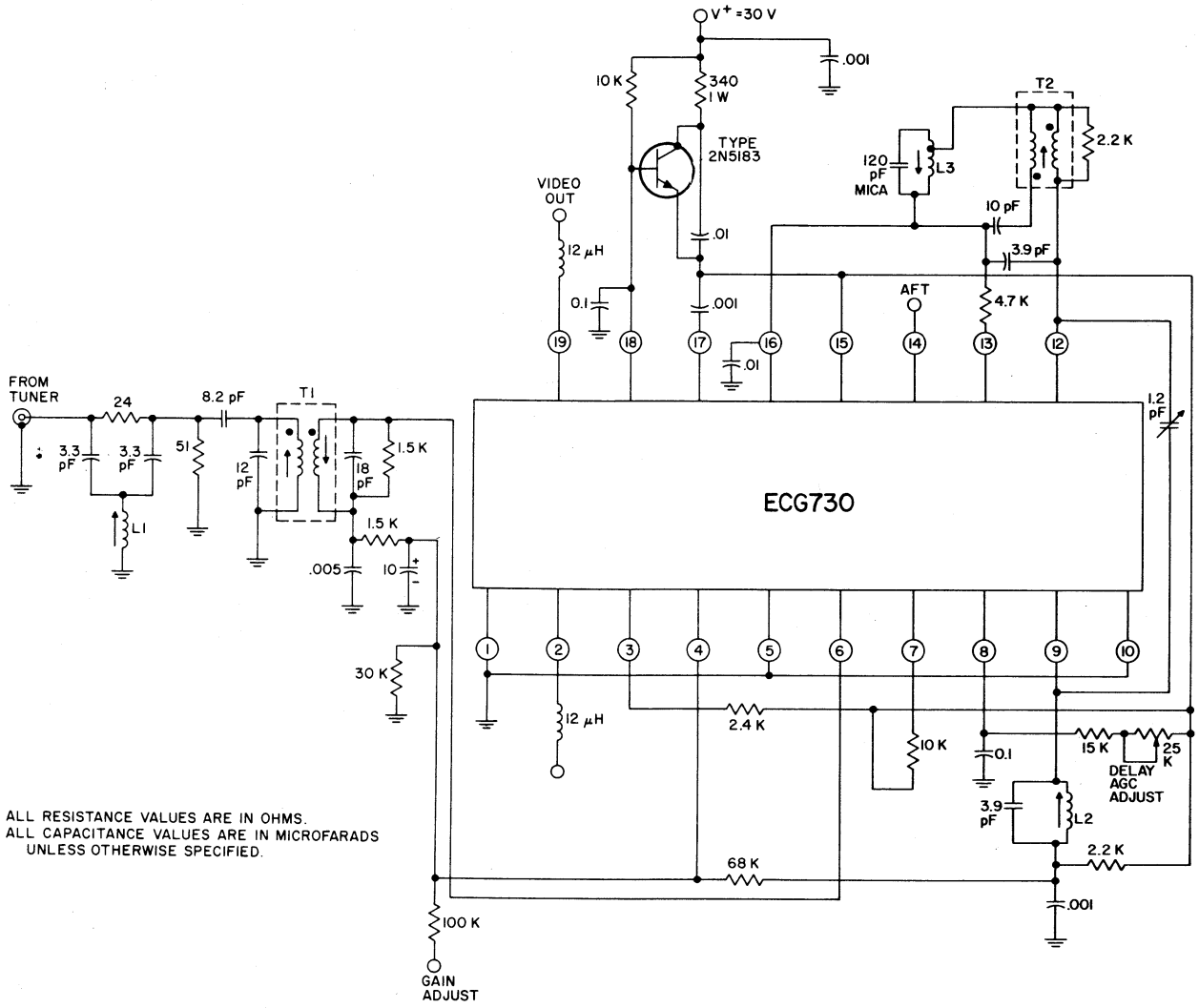


Fig. 7a – Color TV-IF amplifier test circuit.

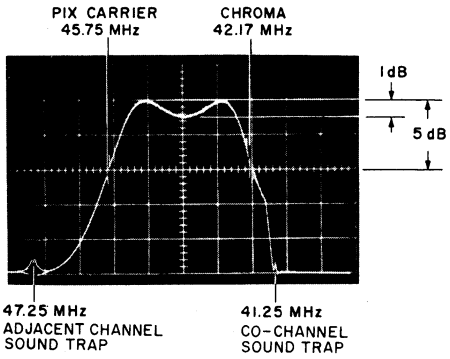


Fig. 7b – Color TV-IF amplifier with associated waveform and test circuit.

Alignment of the IF Amplifier

1. **Apply a 2 to 4 mV signal from a sweep generator, Telonic SV13 or equivalent to the input of the IF amplifier.**
2. **Apply a negative DC supply voltage, to the Gain Adjust Terminal.**
3. **Set the gain supply voltage to provide a peak-to-peak output of 6 volts.**
4. **The overall response curve should conform to the waveform shown in Fig. 7b.**

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